REMARKS/ARGUMENTS

Applicants appreciate the withdrawal of the previously applied rejections. As will be shown below, the new rejections should similarly be withdrawn, and this case passed to Issue.

The present invention relates to a method for tanning that uses a clay mineral which either has a number average particle diameter of less than 2 μm, or a bimodal size distribution with a first, finely divided fraction whose number average particle diameter is less than 0.5 μm, and a second, coarser fraction whose number average particle diameter is less than 5 μm. The amount of the first, finely divided fraction is from 10 to 90% by weight. This clay mineral is used in combination with one or more substances selected from the group consisting of organic polymers, aldehyde tanning agents, sulfone tanning agents, resin tanning agents, phenol tanning agents, fatliquoring agents, vegetable tanning agents, dyes, pigments and mixtures thereof.

Plapper, the only applied reference that discusses particle size, broadly suggests a particle size range for his disclosed aluminosilicates of from 0.2 to 25 μm (col. 9, lines 15-20).[1] However, all of Plapper's Examples use rather large particles: see, e.g., aluminosilicates A - C at columns 13-14 using particle sizes of 3-6 μm (A), and 5.4 μm (B and C). Aluminosilicate H uses particles of 7 μm (col. 16) and aluminosilicate R uses particles of 12.3 μm (Col. 19). Further examples using even larger particle sizes are also present. In addition to the large size, none of the Examples use a bimodal distribution of two particle sizes, nor is a bimodal distribution suggested in the reference. Importantly, particle size is not identified as, or suggested to be, a result effective variable in Plapper or in any other reference cited against the claims.

[1] Applicants assume for the purposes of this response only that the units of particle size in Plapper (μ) correspond to those in the present application (μm).

In establishing the patentability of the present application the inventors have shown, in the present specification, that using particles with sizes like those used in Plapper, i.e., particles of 3.2, 5.1, 7.6, and 13.2 μm, provides poor results, while using particles having the sizes claimed herein provides exceptionally good results.

In particular, the present specification explains that a tanning method using particles having sizes as claimed herein provides a significantly improved selective filling effect, i.e. loose regions are preferably filled, with the result that an improvement in leather quality and surface yield is achieved. In addition, grain tightness is considerably improved, i.e. creasing or spliceability on the surface is considerably reduced or avoided, and the leather quality is increased by an improved embossability and by an increase in tensile strength. See, e.g., specification page 5.[2]

An important quality feature in tanning, in particular in the case of chrome-free leathers, is the shaveability of the semifinished product. This is also improved by the invention, resulting in improved surface characteristics and a level thickness of the shaved hide and reduced tool wear, in particular knife wear, during the shaving process. In addition, the time gain owing to the improved processibility due to the reduced adhesion of the shaving knife is also considerable.

These improvements of the claimed invention are shown in Table 1 at Specification page 7, where particles having sizes very close to those used in Plapper and outside the presently claimed range (denoted "C") are compared with several examples according to the invention using the presently claimed particles (denoted "E"):

[2] A further substantial advantage of the claimed process is a significant improvement in environmental compatibility by virtue of the fact that liquor exhaustion, in particular with respect to the fatliquoring agent, is improved by up to 50% with the invention process, with a correspondingly lower wastewater pollution. See specification page 6.

TABLE 1

	Clay mineral	Mean particle size [μm]	Solids content of liquor [g]	Shaveability [Rating 1–5]	Shrinkage temperature [° C.]
C 1.0	—	—	—	3	79
C 1.1	Kaolin	13.2	3.8	3.5	77
C 1.2	Kaolin	7.6	2.9	3	78
C 1.3	Kaolin	5.1	2.7	2.5	78
C 1.4	Kaolin	3.2	1.4	2.5	79
E 1.1	Kaolin	1.3	0.55	1.5	81
E 1.2	Montmorillonite	0.6	0.30	1	83
E 1.3	Kaolin/ montmorillonite	bimodal 0.6/3.2	0.7	1	82
E 1.4	Kaolin/ bentonite	0.2/1.3	0.35	1	82

A comparison of the results of comparative experiments C1.0 to C1.4 and of the examples according to the invention E1.1 to E1.4 shows a substantial reduction in the solids content of the liquor after the tanning process (fourth column in table 1), i.e. a substantial improvement in the liquor exhaustion, and an improvement in the shaveability (5th column) and the shrinkage temperature (last column).

Table 2 of the present specification similarly shows a substantial quality improvement with respect to body, grain tightness, softness, levelness of the dyeing/fatliquoring and with respect to tensile strength and stitch tear resistance for the leathers obtained in examples E2.1 and E2.2 according to the invention compared with comparative examples C2.0 and C2.1, where the clay mineral particle size in C2.1 was 13.2μm:

TABLE 2

	Clay mineral	Body	Grain tightness	Softness	Tensile strength [N]	Stitch tear resistance [N]	Levelness Dyeing/ Fatliquoring	COD [mg O_2/l liquor]
C 2.0	—	3	3.5	3	428	302	3	16 200
C 2.1	C 1.1	3	3	3.5	410	292	2.5	14 800
E 2.1	E 1.1	2	2.5	2	452	319	1	10 700
E 2.2	E 1.4	1.5	2	2.5	449	328	1.5	6 900

In addition, particles outside the presently claimed range and again similar to what was used in Plapper having a size of 13.2 and 5.1 μm were used in Comparative Examples C3.1 and C3.2, respectively, and compared against three embodiments of the present invention using claimed particle sizes as used above in examples E1.1 - E1.3. As shown in Table 3, the results demonstrate an improvement in all quality features for the invention particles, i.e., body, grain tightness, softness, tensile strength, stitch tear resistance, levelness, embossing, and liquor exhaustion:

TABLE 3

	Clay mineral	Liquor exhaustion	Body	Grain tightness	Softness	Tensile strength [N]	Stitch tear resistance [N]	Levelness	Embossing
C 3.0	—	3.0	3	3.5	3	268	192	3	3
C 3.1	C 1.1	4	3	3	3.5	248	188	2.5	3.5
C 3.2	C 1.3	3.5	2.5	2.5	3	259	194	2	3
E 3.1	E 1.1	2.5	2	2.5	2	277	201	1	2.5
E 3.2	E 1.2	2	2	1.5	2	284	223	1	1.5
E 3.3	E 1.3	1.5	1.5	2	2.5	289	218	1.5	1.5

Thus, and because the combination of prior art actually teaches away from the claimed particle size by using sizes outside the claimed ranges, and because Applicant has shown that a substantial, unpredicted benefit is in fact obtained when operating according to

the claims as opposed to using the particle sizes exemplified in Plapper, the obviousness rejection herein should be withdrawn. This is especially the case here because the prior art does not identify particle size as a result effective variable, and clearly does not appreciate or realize the benefits that are obtained when using the particle sizes as claimed. As such, any arguable *prima facie* case is overcome by the showings herein.

Accordingly, and in view of the above, Applicants respectfully request the withdrawal of the outstanding rejections, and the passage of this case to Issue.

Respectfully submitted,

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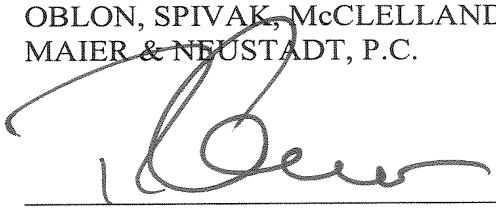

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